RUTIN IN GREEN ASPARAGUS

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Glass jars of home-canned asparagus have been observed to contain a yellow deposit. Campbell (1939) has reported some studies on the nature of this deposit. He found the material to consist of aggregates of fine, needle-like crystals which were soluble in hot water and alcohol but insoluble in ether and gave color reactions characteristic of flavone derivatives. Aqueous solution of the crystals was yellow and did not reduce Fehling's solution. After hydrolysis with dilute hydrochloric acid, a deep-yellow substance was precipitated. This product of hydrolysis was insoluble in hot water but was soluble in ether and cold alcohol. The filtrate, after removal of the water-insoluble precipitate, reduced Fehling's solution. These findings suggested that the substance was a flavone glucoside and substantiated the report of Nakaoki (1932) that a derivative of the flavone series is present in fresh asparagus.

Because of a current interest in rutin obtained from buckwheat [Couch, Krewson, Naghski, and Copley (1946)] and an investigation of its pharmacological properties, a few tests have been made to determine whether or not the pigment found in green asparagus by Campbell was rutin. A sample of the compound studied by Campbell was available for examination.

In a report on some pharmacological properties of rutin by Wilson, Mortarotti, and DeEds (1947) it has been shown that rutin, in a concentration which produces no effect *per se*, prolongs the relaxation of excised guinea-pig colon induced by epinephrine. These same authors have unreported data which show the ability of rutin to stimulate the excised frog heart. These two techniques have been used in a study of the compound obtained from asparagus. The ability of the asparagus product to prolong the action of epinephrine is clearly demonstrated (Fig. 1); the marked stimulation of the excised frog heart produced by the same flavone derivative is shown (Fig. 2).

Crystals of rutin obtained from buckwheat (Fig. 3) and crystals of the compound found in green asparagus (Fig. 4) have been examined under the polarizing microscope and found to have the same optical and crystallographic properties. The birefringence, sign of elongation, and color of the two crystalline products were the same.

A sample of the asparagus compound was examined spectrophotometrically with the following results:

Maxima near 3627Å and 2577Å; minima 2827Å and 2352Å;
$K_{362.5} = 31.9$, $K_{375.0} = 27.97$, ratio 0.877.

The corresponding figures for pure rutin are 3627Å and 2577Å; 2827Å and 2352Å; 32.55 and 28.46, ratio 0.875 [Porter, Brice, Copley, and Couch (1947)].

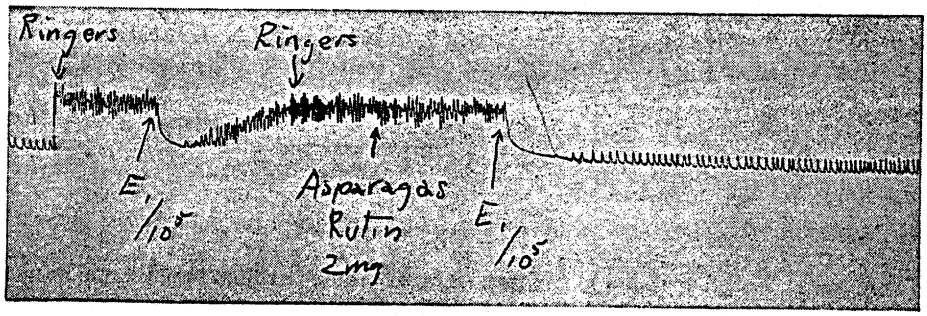

FIG. 1. Relaxation of excised guinea-pig colon by epinephrine, which is greatly prolonged in the presence of rutin obtained from asparagus.

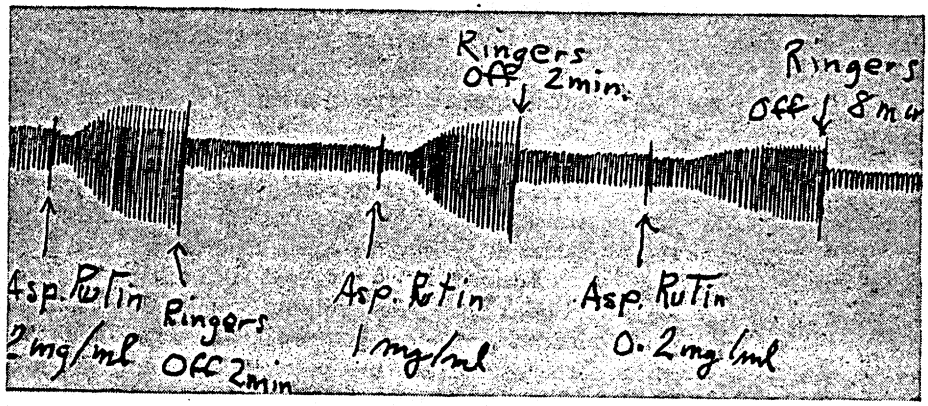

FIG. 2. Stimulation of excised frog heart by rutin obtained from asparagus.

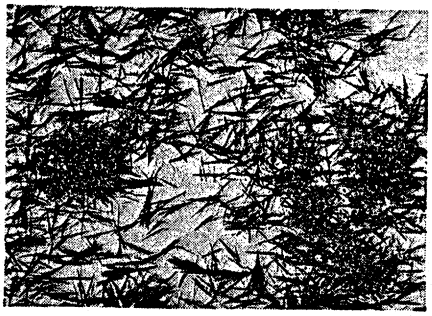

FIG. 3. Crystals of rutin obtained from buckwheat.

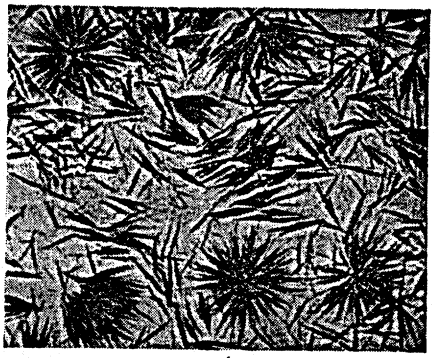

FIG. 4. Crystals of rutin obtained from asparagus.

These data identify the yellow deposit as crude rutin. The optical measurements indicate a content of approximately 95 per cent rutin in the crude deposit.

ACKNOWLEDGMENT

We are indebted to T. G. Mortarotti for the tests on excised organs, to Dr. F. T. Jones for the crystallographic examination, and to Dr. W. L. Porter for the spectrophotometric data.

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